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BULLETIN

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North American species of Calceolaria

PHILIP DOWELL

(WITH PLATES 18-22)

The first records we find of plants belonging to this genus of Violaceae are those of Pehr Löfling, a Swedish naturalist, who was employed by the Spanish government to study the natural history of Spain. Among the specimens collected by him in South America were three species of violaceous plants which he described under the generic name *Calceolaria* (Iter Hisp. 183. 1758). His descriptions were full, but he did not designate the species by binomials. Linnaeus published these three species with binomials in 1763, but he assigned them to *Viola*. In 1766 Dr. A. B. Kölpin published a German edition of Löfling's Iter, and at the head of each of the three species of *Calceolaria* the corresponding binomial given by Linnaeus is inserted. According to Kölpin these insertions were made by Linnaeus, who also had edited the 1758 edition of the Iter after Löfling's death. Thus *Calceolaria* dates from 1766 and is to be credited to Löfling. Jacquin's *Hybanthus* (Enum. Pl. Carib. 2. 1760) is a different genus and does not include any of our species. Sprengel (Jour. Bot. Schrad. 4: 192. 1800) proposed the name *Solea* for Ortega's *Viola verticillata*, which he described and figured. The name that seems to have been more in use than either of the preceding is *Ionidium* (Vent. Jard. Malm. *pl. 27.* 1804), the type of which is *I. polygalaefolium*, the same species as Sprengel's *Solea verticillata.*

Out of some 45 species described, about 20 species of *Calceolaria* have been reported as found in North America, including

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the West Indies; a few occur in the Old World, and the rest are South American. The North American species are found chiefly in Mexico, only a few having been reported from Central America and the West Indies, and only one from the United States. The species included in this paper are only such as are represented by specimens in the Gray Herbarium of Harvard University, in the herbaria of the United States National Museum, Columbia University and the New York Botanical Garden, and in the private herbarium of Mr. T. S. Brandegee.

CALCEOLARIA Löfl. (Iter Hisp. 183; hyponym. 1758) Reise 244. 1766. Type, *Viola Calceolaria* L.
SOLEA Spreng. Jour. Bot. Schrad. 4: 192. 1800
IONIDIUM Vent. Jard. Malm. *pl. 27*. 1804

Herbs, or rarely small shrubs, with simple alternate or opposite leaves and axillary or racemose flowers. Peduncles or pedicels one-flowered, solitary in the axils of the leaves or bracts, mostly bibracteate near the middle, articulate above the middle. Sepals unequal, not appendaged at the base. Lower petal largest, saccate or gibbous at the base; the two lateral petals longer than the upper pair. Stamens alternate with the petals, each of the lower with a gland or spur at the base, membranaceous at the top by the prolongation of the filament above the anther; anthers connivent. Capsule few-ovuled, otherwise similar to that of *Viola*. Seeds ovoid-globose with hard seed-coats; "embryo straight, central in the fleshy perisperm; cotyledons ovate."

Analytical key

- Lower petal less than twice the length of the sepals.
  - Flowers axillary.
    - Leaves narrow, linear to oblong, usually entire. 1. *C. verticillata.*
    - Leaves wider, usually ovate.
      - Petiole short or none. 2. *C. glutinosa.*
      - Petiole 1 cm. long or longer. 3. *C. tenuifolia.*
  - Flowers racemose. 4. *C. fruticulosa.*
- Lower petal twice as long as the sepals or longer.
  - Stipules minute, 5 mm. or shorter.
    - Plant procumbent, small. 5. *C. procumbens.*
    - Plant erect or ascending.
      - Leaves alternate or clustered.
        - Flowers long-peduncled. 6. *C. longipes.*
        - Flowers short-peduncled. 7. *C. glabra.*
      - Lower leaves usually opposite.
        - Leaves about twice as long as broad or shorter.
          - Leaves crenulate-serrate, glabrate. 8. *C. brevis.*

Leaves crenate-serrate, pubescent. 9. *C. verbenacea.*
Leaves more than twice as long as broad.
Leaves mostly linear, the lowest sometimes wider.
Leaves obovate to oblong-linear, 2–3 cm. long. 10. *C. stricta.*
Leaves lance-linear to linear, 4–8 cm. long. 11. *C. angustifolia.*
Leaves mostly lanceolate.
Leaves gradually tapering at the base. 12. *C. riparia.*
Leaves truncate or abruptly tapering at the base. 13. *C. nigricans.*
Stipules larger, foliaceous.
Leaves ovate to orbicular, mostly obtuse.
Leaves mostly opposite. 14. *C. humilis.*
Leaves mostly alternate. 15. *C. Rosei.*
Leaves lanceolate to linear. 16. *C.* sp.

1. CALCEOLARIA VERTICILLATA (Ort.) Kuntze

Viola verticillata Ort. Dec. **4**: 50. 1797.
Solea verticillata Spreng. Jour. Bot. Schrad. **4**: 192. *pl. 6.* 1800.
Ionidium polygalaefolium Vent. Jard. Malm. *pl. 27.* 1804.
Viola polygalaefolia Poir. Enc. Meth. **8**: 647. 1808.
Ionidium lineare Torr. Ann. Lyc. N. Y. **2**: 168. 1828.
Ionidium stipulaceum Nutt.; Torr. & Gray, Fl. N. Am. **1**: 144. 1838.
Calceolaria verticillata Kuntze, Rev. Gen. Pl. 41. 1891.

This species is reported as "intertropical both in the New and the Old World." It has been found as far north as Colorado and is common in the southwestern states and in Mexico. It shows considerable variation in the length and shape of its leaves, which are short and obovate in some specimens and long and linear in others, with numerous intermediate forms.

2. CALCEOLARIA GLUTINOSA (Vent.) Kuntze

Ionidium glutinosum Vent. Jard. Malm. *pl. 27.* 1804.
Viola glutinosa Poir. Enc. Meth. **8**: 647. 1808.
Solea glutinosa Spreng. Syst. **1**: 803. 1825.
Calceolaria glutinosa Kuntze, Rev. Gen. Pl. 41. 1891.

The specimens collected on ballast near Communipaw Ferry, N. J., by *Jos. Schrenk*, July 20, 1880, and by *Addison Brown*, September, 1880, are like the South American specimens. There are specimens from Communipaw Ferry in the Gray Herbarium, the U. S. National Herbarium, and in the Columbia Herbarium in the N. Y. Botanical Garden.

3. **Calceolaria tenuifolia** sp. nov. (PLATE 18)

Stem herbaceous, erect, branching, somewhat striate, loosely puberulent, 3 dm. high or taller; branches erect or ascending, weak, similar to the stem; leaves opposite below, alternate above, the blade ovate-lanceolate, gradually tapering to a blunt apex, abruptly decurrent on the petiole at the somewhat oblique and rounded base, thin and lax, nearly glabrous, light-green, paler beneath, with low distant teeth, subciliate, 3–7 cm. long, 1.5–2 cm. wide; petiole very slender, channeled, puberulent, 1 cm. long; stipules linear, ciliolate, 2–3 mm. long; flowers 2–3 mm. long, axillary, nodding, on filiform finely puberulent peduncles, which are less than 1 cm. long; bracts on the peduncles slightly below the middle; sepals oblong, obtusish, nearly glabrous, finely ciliolate; lower petal 3 mm. long, about one third longer than the sepals, spatulate, notched, winged near the base, glabrous.

The specimens were not in the fruiting stage, so the characters of the fruit were not observed.

LOWER CALIFORNIA: San José del Cabo, *T. S. Brandegee, no. 18*, type. Specimens in the Gray Herbarium and in Brandegee's herbarium, collected September 6, 1890.

4. CALCEOLARIA FRUTICULOSA (Benth.) Kuntze

Ionidium fruticulosum Benth. Bot. Voy. Sulph. 7. *pl. 2*. 1844.

Ionidium fruticulosum dentatum A. Gray, Proc. Am. Acad. **5**: 154. 1861.

Calceolaria fruticulosa Kuntze, Rev. Gen. Pl. 41. 1891.

The type locality is Cape San Lucas, Lower California, from which locality there are specimens in all the herbaria mentioned in this paper.

It should be noted here that some of the specimens show two sets of leaves that are quite different in general shape and aspect. The older leaves may be described as thin, membranous, with veins prominent beneath; alternate, ovate-lanceolate to linear-lanceolate, gradually tapering to the apex, more abruptly tapering at the base and decurrent on the petiole, dentate with prominent unequal rather distant teeth, 3–6 cm. long, 1–2 cm. wide, with petiole 0.5–1 cm. long. The younger or later leaves are mostly linear, entire or subentire, with shorter petiole. Bentham's description and figure were evidently made from specimens that had lost the older or larger leaves. Gray's variety *dentatum* is based on specimens having the larger leaves present.

Calceolaria fruticulosa flavescens var. nov.

Herbaceous, erect, branching, glabrous ; leaves ovate to ovate-lanceolate, more uniform than in the type of the species ; petioles longer ; inflorescence more decidedly racemose. The lighter-colored stem suggests the name.

SONORA, MEXICO : Guaymas, *Dr. E. Palmer, no. 253* (October, 1887), type ; and *no. 258* (October, 1897) ; *T. S. Brandegee*, November 7, 1893.

5. CALCEOLARIA PROCUMBENS (Griseb.) Kuntze

Ionidium procumbens Griseb. Cat. Pl. Cub. 11. 1866.

Calceolaria procumbens Kuntze, Rev. Gen. Pl. 41. 1891.

C. Wright no. 1898, collected in western Cuba, 1860–4, is the plant referred to by Grisebach in his description. Specimens are in the Gray Herbarium, the U. S. National Herbarium, and the Columbia Herbarium in the N. Y. Botanical Garden.

6. **Calceolaria longipes** sp. nov. (PLATE 19)

Stem erect, branched above, woody at the base, terete, ridged or striate, pubescent, about 2 dm. high ; leaves alternate, crowded above, ovate to oblong-elliptical, abruptly narrowed at the rounded oblique base, appressed-pubescent especially on the upper surface, ciliolate, serrate with gland-tipped teeth, thin, dull-green, paler beneath, the veins prominent on the under side ; 2–7 cm. long, 1–3.5 cm. wide ; petioles pubescent, channeled, somewhat flattened, 1–2 cm. long ; stipules linear, slender and minute, ciliolate ; flowers erect or nodding, axillary, on puberulent filiform peduncles, which are 2–3.5 cm. long ; lip 3-nerved, rhombic-ovate, obtuse, pubescent outside, glabrous inside, much involute in dried specimen, 3 times as long as its claw, 9–10 mm. long, 8–10 mm. wide ; claw slender, channeled, puberulent ; lateral petals veiny, 5-nerved, slightly exceeding the sepals ; upper pair of petals oblong, about two-thirds the length of the sepals ; sepals lanceolate, acuminate, 3–5-nerved, ciliolate, puberulent on the veins, nearly equal, 3–4 mm. long ; capsule rather small, ovate, obtusely 3-angled, hairy, capped with the persistent style, which is nearly as long as the capsule ; seeds minutely pitted, one in each of the three cells, straw-colored.

CHIAPAS, MEXICO: *E. W. Nelson no. 2961*, type. Specimens in the U. S. National Herbarium, collected August 18, 1895, between San Richardo and Ocozucuantla, alt. 800–1000 m.

7. **Calceolaria glabra** sp. nov. (PLATE 20)

Stem erect, flexuous, angular, puberulent to glabrous; leaves alternate, obovate to elliptical, acuminate, gradually tapering at the base and decurrent on the petiole to the stem, crenulate-serrate, glabrous, or finely puberulent and pale on the under side, 7–14 cm. long, 3–4 cm. wide including the winged petiole, which is 2–3 cm. long, the lower leaves smaller; stipules linear-lanceolate, somewhat puberulent, 1–3 mm. long; flowers axillary on puberulent peduncles which are 0.5–1 cm. long; sepals thin, ciliolate, linear-lanceolate 3-nerved, 4 mm. long; lip orbicular, veiny, about as long as its puberulent claw, which widens toward the base; lateral petals falcate, 3-nerved or faintly 4-nerved, 5 mm. long; upper petals oblong, 1-nerved; connectiles of all the stamens puberulent on the outside; capsule large, smooth and veiny, with prominent beak, 8–10 mm. high.

VERA CRUZ, MEXICO: *Charles L. Smith no. 1840*, type. Specimen in the U. S. National Herbarium, collected in 1894 at Banderilla near Jalapa, alt. 1200–1400 m.

8. **Calceolaria brevis** sp. nov. (PLATE 21)

Branching from a woody base; branches ascending, pubescent in two lines; leaves mostly alternate, short-petioled, obovate to ovate, tapering at both ends, crenate-serrate, hispidulose, paler on the under side, 2–5 cm. long, 1–2 cm. wide; stipules minute, lanceolate-subulate, ciliolate; flowers nodding, axillary, on slender puberulent peduncles which are 10–12 mm. long, the bracts opposite at or near the articulation; sepals lanceolate, acuminate, ciliate, puberulent, obscurely 3-nerved, about equal, 3 mm. long; lip 3-nerved, veiny, broadly rhomboid-orbicular, abruptly contracted at the base, 3–4 mm. in diameter; claw somewhat channeled, puberulent, broadest near the base, winged, longer than the lip and exceeding the lateral petals, which are falcate and 4-nerved; upper petals oblong-obovate, 3-nerved, veiny, glabrous; connectile of the lower stamens puberulent on the outside; capsule subglobose, glabrous, with a short thickened beak, each cell with about two orbicular seeds.

GUATEMALA: *Heyde & Lux* in John Donnell Smith's distribution *no. 3943*, September, 1892, and *no. 4435*, May, 1893, type. Specimens in the Gray Herbarium, the U. S. National Herbarium, and the Columbia Herbarium in the N. Y. Botanical Garden, collected at Volcan Jumaytepeque, Depart. Santa Rosa, alt. 1,850 m.

In the Gray Herbarium is one sheet labeled *E. T. Heyde no. 449.* 1892. This is the same as *no. 3943* in J. D. Smith's distribution, and these specimens were probably all collected at the same place. Those collected in May, 1893, show the growth of a different season, with more simple stem and larger leaves. The leaves on the more numerous branches of the September growth are smaller than those of the main stem, and since only few of the stem-leaves are retained in this stage, the general appearance of the plants in the two stages is quite different.

9. CALCEOLARIA VERBENACEA (H. B. K.) Kuntze

Ionidium verbenaceum H. B. K. Nov. Gen. & Sp. **5**: 379. *pl. 497.* 1821.

Solea verbenacea Spreng. Syst. **1**: 803. 1825.

Calceolaria verbenacea Kuntze, Rev. Gen. Pl. 41. 1891.

E. Palmer no. 55, July, 1880, collected at Coahuila, Mexico, is here considered as belonging to this species. Specimens are in the Gray Herbarium, U. S. National Herbarium, and the Columbia Herbarium. This determination is based on comparison of the specimens with the published description and plate in H. B. K. Nov. Gen. & Sp. and not on comparison with authentic specimens, and I am not entirely satisfied that our plants are the same as those described as *I. verbenaceum.*

10. CALCEOLARIA STRICTA (Vent.) Kuntze

Ionidium strictum Vent. Jard. Malm. *pl. 27.* 1804.

Viola stricta Poir. Enc. Meth. **8**: 648. 1808.

Solea stricta Spreng. Syst. **1**: 803. 1825.

Calceolaria stricta Kuntze, Rev. Gen. Pl. 41. 1891.

Found in Mexico according to Grisebach, otherwise in the West Indies. San Domingo is given as the type locality, from which there is a specimen in the U. S. National Herbarium collected by *Wright, Parry & Brummell*, January-March, 1871. In the Columbia and the Gray herbaria are specimens collected by *C. Wright* in Eastern Cuba, *no. 20*, 1856–7.

11. **Calceolaria angustifolia** (H. B. K.)

Ionidium angustifolium H. B. K. Nov. Gen. & Sp. **5**: 377. 1821.
Solea longifolia Spreng. Syst. **1**: 803. 1825.

MEXICO: San Luis Potosi, *C. G. Pringle no. 5011*, August 21, 1891. Also Prov. Huasteca, near Tantoyuca, *L. C. Ervendberg no. 210*, September, 1858. These specimens are in the Gray Herbarium.

The determination is based entirely on description. Sprengel considers his *Solea longifolia* a variety of *S. stricta.*

12. CALCEOLARIA RIPARIA (H. B. K.) Kuntze

Ionidium riparium H. B. K. Nov. Gen. & Sp. **5**: 378. 1821.
Ionidium parietariaefolium DC. Prod. **1**: 308. 1824.
Solea riparia Spreng. Syst. **1**: 803. 1891.
Calceolaria riparia Kuntze, Rev. Gen. Pl. 41. 1891.

Whether the large number of specimens that have been considered as belonging here are varying forms of the same species or not is a question that could best be answered by field work. I hesitate to put down *I. parietariaefolium* as a synonym of *I. riparium*, but DeCandolle's description of *I. parietariaefolium* is too meager to make sure of his plants. His variety *Houstoni*, however, is recognizable in some of the herbarium material. We include here under *C. riparia* such specimens as *Wright no. 859* from Sonora, Mexico, collected in 1851; *E. Palmer no. 1826* from Tepic, Mexico, 1892; and *T. S. Brandegee's* specimen from El Taste, Lower California, November, 1902. These specimens differ considerably, however, from such as *E. Palmer nos. 25* and *93* from Chihuahua, Mexico, 1885, and *C. G. Pringle no. 6391* from Morelos, Mexico, July, 1896.

Calceolaria riparia Houstoni (DC.)

Ionidium parietariaefolium Houstoni DC. Prod. **1**: 308. 1824.

This is characterized chiefly by its more prominently sharp-toothed leaves. Here we include such specimens as *M. Bourgeau no. 2661* from Orizaba, Mexico, 1865–6, and *Rose & Hay no. 6158* from Vera Cruz, Mexico, August 16, 1901.

13. **Calceolaria nigricans** sp. nov.

Stem woody, puberulent, terete; leaves alternate, the blade ovate-oblong, mostly acute and pointed, truncate and somewhat oblique at the base, glabrate, serrulate with low rounded teeth furnished with white callous points, firm, 3–7 cm. long, 1.5–2.5 cm. wide; petioles slender, terete, puberulent, 4–12 mm. long; stipules minute, subulate, about 1 mm. long; flowers solitary, axillary, nodding; peduncles filiform, finely puberulent, 1–3 cm. long; sepals lanceolate, 4–5 mm. long; lip of the lower petal rhombic-ovate, 6 mm. long, longer than the claw; capsule 6 mm. long, with a short beak.

HONDURAS: *C. Thieme* in J. D. Smith's distribution *no. 5127*, type. Specimen collected in May, 1889, at San Pedro Sula, Santa Barbara, alt. 250 m.

14. CALCEOLARIA HUMILIS Rose & Dowell; Rose, Contr. U. S. Nat. Herb. **10**: 125. *pl. 42.* 1906

Perennial; stem herbaceous, branching from the woody base, 1–2 dm. high; branches decumbent or ascending, pubescent in two lines; leaves opposite, short-petioled, the blades 1–3 cm. long, 1–2 cm. wide, orbicular to ovate, acute or obtuse, glabrous, crenate-serrate, decurrent on the ciliolate petiole, which is about 2 mm. long; stipules subulate to lanceolate and foliaceous, 4–8 mm. long, glabrous; flowers violaceous, nodding, on slender axillary puberulent peduncles, which are 6–8 mm. long, the bracts opposite near the articulation; sepals lanceolate, acuminate, 3-nerved, glabrous, 4 mm. long; lip orbicular, slightly longer than the claw, 4–5 mm. long; the claw broadly winged, 5-nerved; lower stamens puberulent on the lower part of the connectile above the gland-like appendages; capsule ovoid-globose, with a blunt beak, glabrous.

VALLEY OF MEXICO: *C. G. Pringle no. 9653*, type. Specimen in the U. S. National Museum, collected July 30, 1901, on lava fields near Tizapan, alt. 2300 m.

15. **Calceolaria Rosei** sp. nov. (PLATE 22)

Stem erect, simple or branched, angular and grooved, pubescent with spreading hairs; leaves alternate, short-petioled, obovate to ovate, mostly obtuse, abruptly narrowed at the base and decurrent on the petiole, crenate, hirsute, rather firm, paler on the under side, 2–4 cm. long, 1–2 cm. wide; stipules lanceolate, ciliate, puberulent, variable in size, some foliaceous; flowers axillary, nodding, on slender puberulent peduncles, the minute bracts variable in position; sepals lanceolate, acuminate, ciliate, pubescent, 3-nerved, about equal; lip 3-nerved, glabrous, rhombic-orbicular to broadly ovate, abruptly contracted on the narrow claw; claw channeled, puberulent, about equaling the lip; petals glabrous, veiny, the lateral falcate, 4-nerved, the upper oblong, 3-nerved; connectiles of lower stamens puberulent.

MEXICO: *Rose & Hough no. 4851*, type. Specimen in the U. S. National Herbarium, collected July 11, 1899, at Guanajuato.

16. CALCEOLARIA sp.*

Specimens of the plant referred to were collected by *T. S. Brandegee*, March 2, 1889, on Santa Margarita Island, Lower California, and are preserved in the Gray Herbarium and in his own private herbarium. The specimen in Mr. Brandegee's herbarium is mounted on the same sheet with two others, all labeled *Ionidium lineare*, and is designated by the figure 2.

It does show a general resemblance to broad-leaved forms of *Calceolaria verticillata* (*Ionidium lineare*), but it is quite distinct from this on account of its larger flowers with the lower petal twice the length of the sepals. On account of its large foliaceous stipules it is placed in the last group and not with *C. stricta* nor with *C. angustifolia.*

Explanation of plates 18-22

PLATE 18. *Calceolaria tenuifolia*

a, whole plant, × $\frac{2}{5}$; *b*, opened flower, × 4.

PLATE 19. *Calceolaria longipes*, × $\frac{2}{3}$

a, petals; *b*, sepals; *c*, lateral view of flower; *d*, dorsal view of flower; *e*, young capsule; *a*, *b*, *c*, *d*, *e*, all × 2.

PLATE 20. *Calceolaria glabra*, × $\frac{2}{3}$

a, petals, × 3; *b*, sepals, × 3; *c*, stamen, × $6\frac{2}{3}$; *d*, mature capsule, × 2.

PLATE 21. *Calceolaria brevis*, × $\frac{3}{4}$

a, petals; *b*, sepals; *c*, stamens; *d*, lateral view of flower; *a*, *b*, *d*, × 2, *c* × 5.

PLATE 22. *Calceolaria Rosei*, natural size

a, upper petals; *b*, lateral petal; *c*, lower petal; *d*, one of the upper sepals; *e*, one of the lower sepals; *f*, upper stamen, dorsal view; *g*, lower pair of stamens, dorsal view; *h*, side view of one of the lower stamens showing the appendage at the base; *i*, flower; *a*, *b*, *c*, *d*, *e* × 3; *f*, *g*, *h* × 4; *i* × 2.

Plates 19-21 were drawn by Prof. Homer D. House, of Clemson College, South Carolina.

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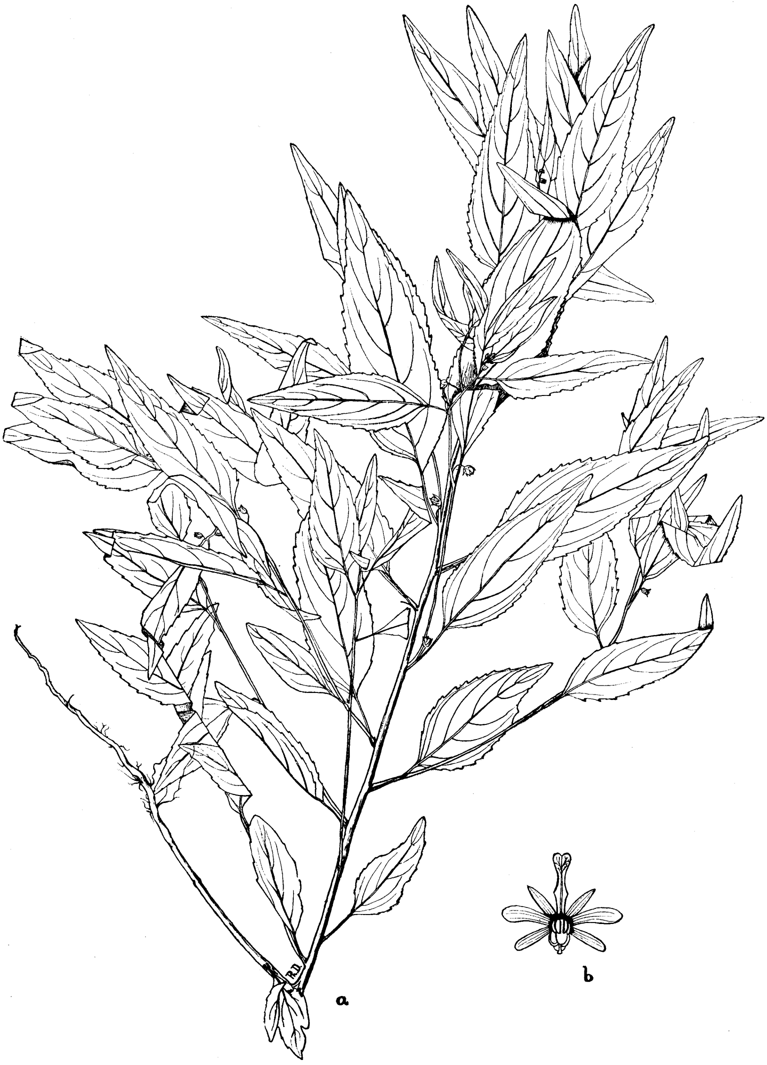
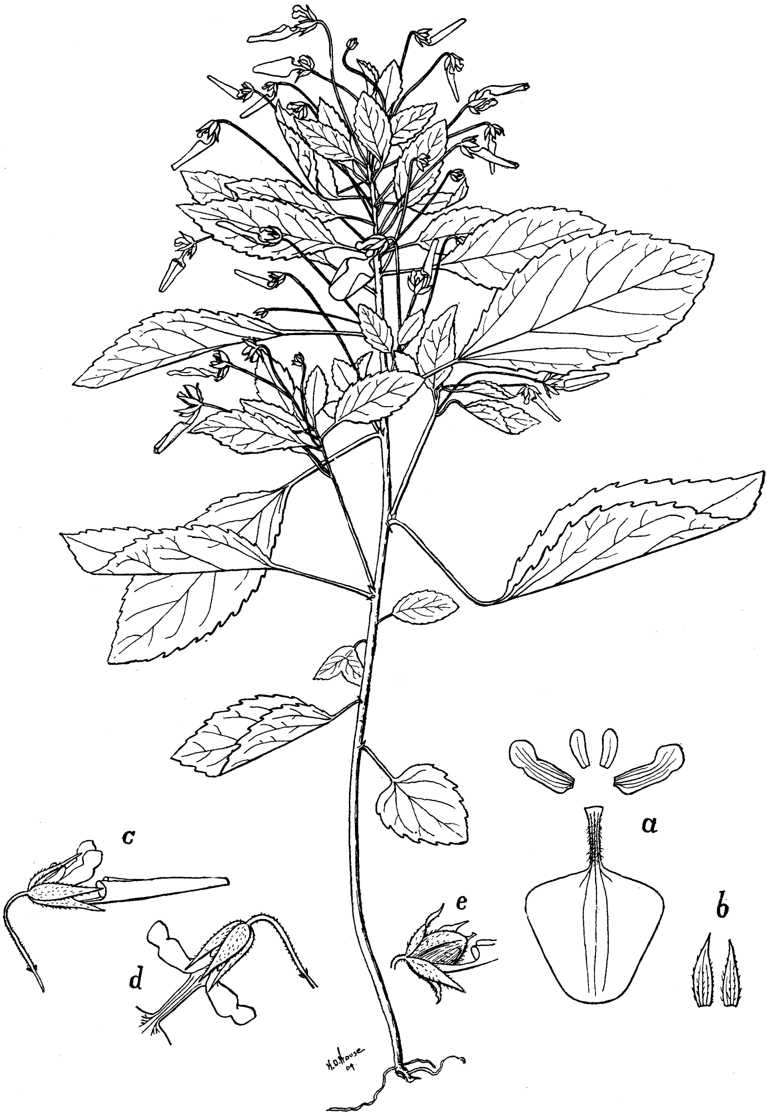
* No description is given, and thus no name, because material is not accessible at present. When specimens were accessible the description was deferred in the hope of getting access to more and better material.



CALCEOLARIA TENUIFOLIA Dowell.



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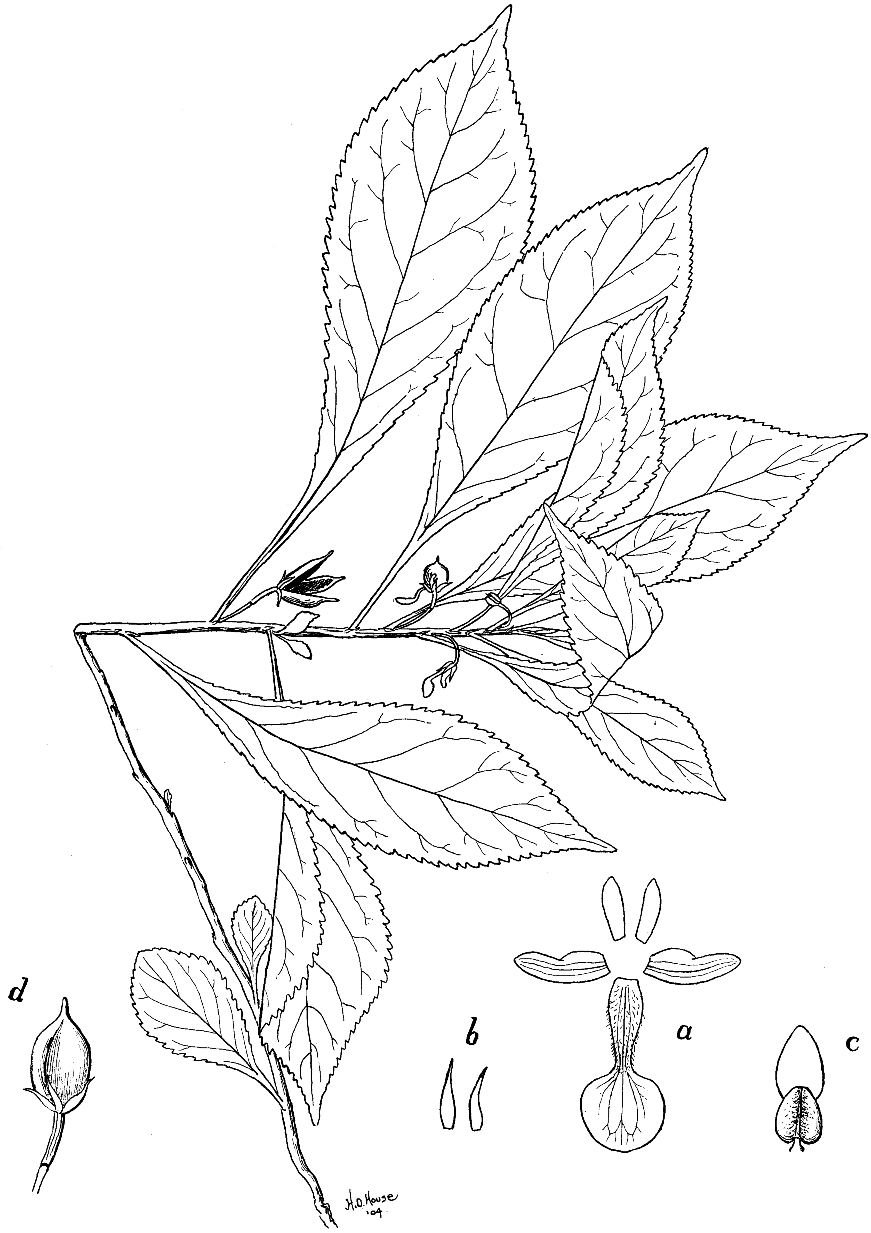

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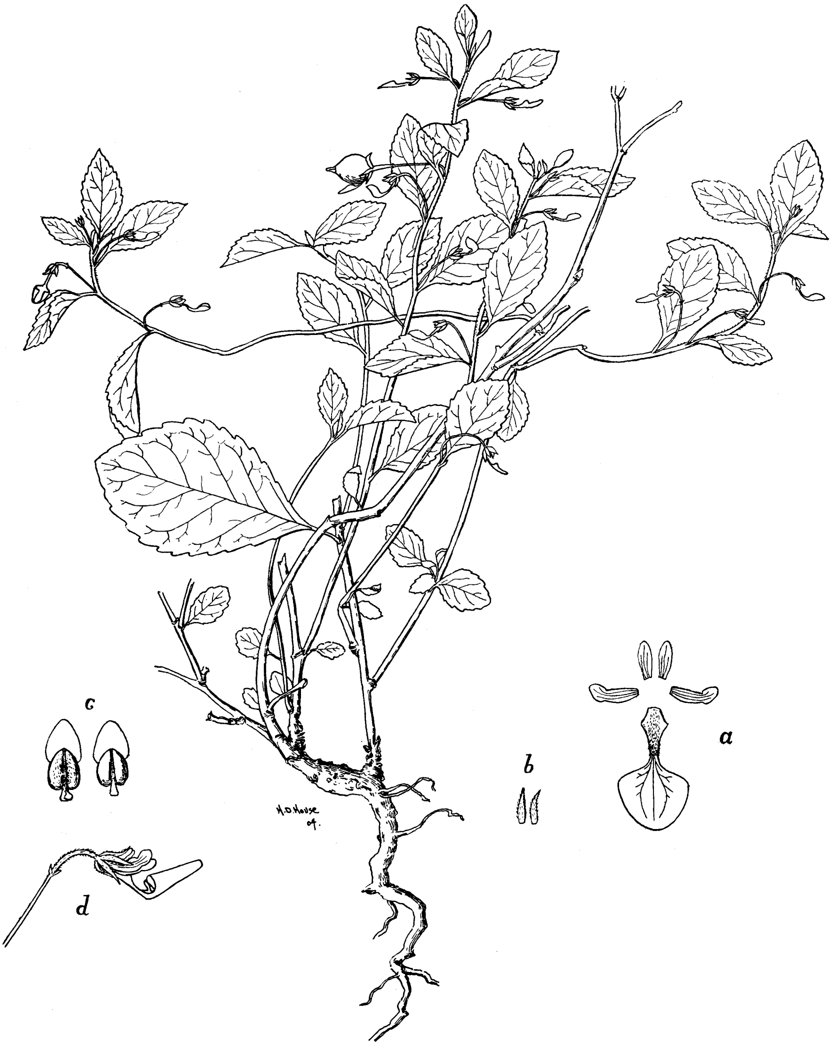

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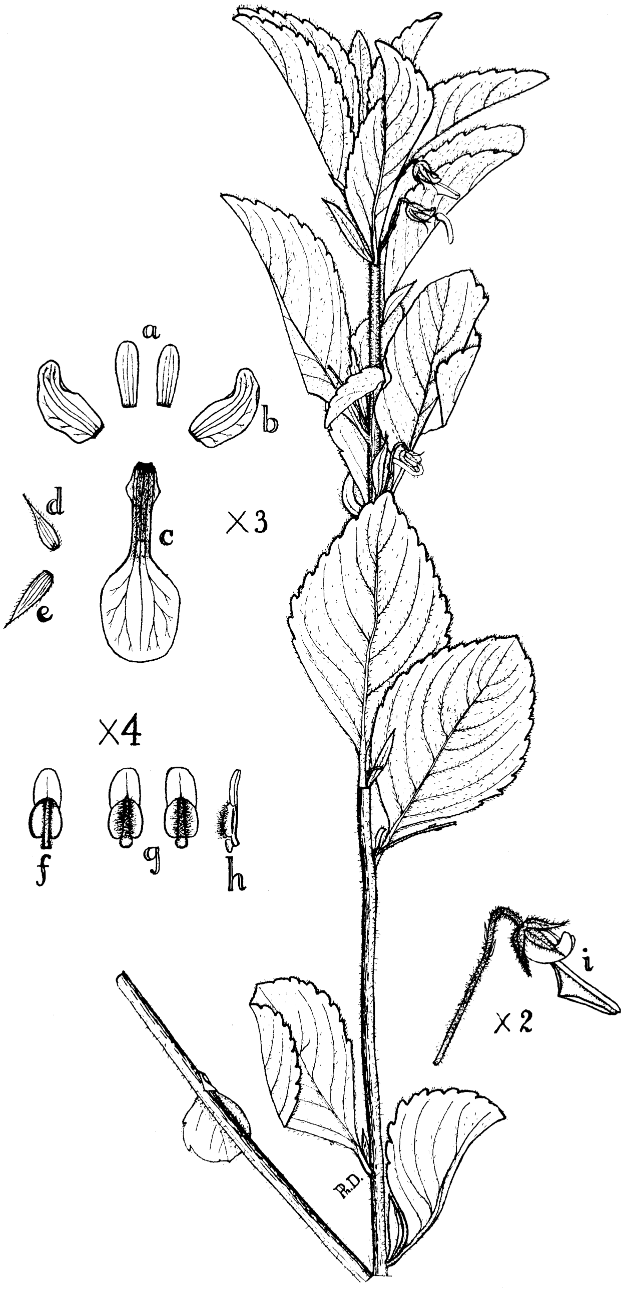

CALCEOLARIA ROSEI Dowell.